

**Technical Specification**

**Transport and Main Roads Specifications  
MRTS71 Reinforcing Steel**

**March 2023**

## Copyright

© The State of Queensland (Department of Transport and Main Roads) 2023.

## Licence



This work is licensed by the State of Queensland (Department of Transport and Main Roads) under a Creative Commons Attribution (CC BY) 4.0 International licence.

## CC BY licence summary statement

In essence, you are free to copy, communicate and adapt this work, as long as you attribute the work to the State of Queensland (Department of Transport and Main Roads). To view a copy of this licence, visit: <https://creativecommons.org/licenses/by/4.0/>

## Translating and interpreting assistance



The Queensland Government is committed to providing accessible services to Queenslanders from all cultural and linguistic backgrounds. If you have difficulty understanding this publication and need a translator, please call the Translating and Interpreting Service (TIS National) on 13 14 50 and ask them to telephone the Queensland Department of Transport and Main Roads on 13 74 68.

## Disclaimer

While every care has been taken in preparing this publication, the State of Queensland accepts no responsibility for decisions or actions taken as a result of any data, information, statement or advice, expressed or implied, contained within. To the best of our knowledge, the content was correct at the time of publishing.

## Feedback

Please send your feedback regarding this document to: [tmr.techdocs@tmr.qld.gov.au](mailto:tmr.techdocs@tmr.qld.gov.au)

## How to use this document

This document is designed to be read and applied together with *ATS 5310 Supply and Placement of Steel for the Reinforcement of Concrete* (June 2020). You must have access to the Austroads documents to understand what applies in Queensland. All Austroads Technical Specifications (ATS) can be downloaded for free from the [Austroads website](#).

This document:

- sets out how ATS 5310 applies in Queensland
- has precedence over ATS 5310 when applied in Queensland
- generally follows the document structure of ATS 5310 with Queensland exceptions
- does not use paragraph numbering / items applied in ATS 5310.

The following table summarises the relationship between ATS 5310 and this document:

<b>Applicability</b>	<b>Meaning</b>
Accepted	The Austroads clause is accepted.
Accepted, with amendments	Part or all of the clause has been accepted with additions, deletions or differences.
New	There is no equivalent clause in Austroads.
Not accepted	The Austroads clause is not accepted.

**Contents**

**How to use this document**.....i

**1 Introduction** .....1

**2 Definition of terms** .....1

**3 Referenced documents** .....2

**4 Quality system requirements** .....3

**5 Materials** .....4

5.22 Substitutions ..... 4

**6 Handling, storage and surface condition**.....5

**7 Placing and fixing** .....5

7.12 Adjustments to placement ..... 6

7.13 Fixing of reinforcement (pile cages) ..... 6

**8 Bending**.....6

8.13 Bending details ..... 6

**9 Splicing of reinforcement** .....7

9.11 Friction-welded couplers ..... 7

**10 Welding of carbon steel reinforcement** .....7

**11 Welding stainless steel reinforcement** .....8

**12 Tolerances** .....8

**13 Standard test methods** .....9

**Annexure A: Summary of Hold Points, Witness Points and Records** ..... 10

## 1 Introduction

This Technical Specification accepts with amendments Clause 1 *Scope* and Items 1.1 and 1.2 of Austroads Technical Specification ATS 5310 *Supply and Placement of Steel for the Reinforcement of Concrete* (June 2020).

### Addition

This Technical Specification applies to the supply, fabrication and placement of steel (including stainless steel) reinforcement used in concrete road, marine and bridge structures, and all other incidental concrete construction.

Steel reinforcement and its supply, fabrication and placement shall comply with ATS 5310 *Supply and Placement of Steel for the Reinforcement of Concrete* unless otherwise noted by this Technical Specification.

This Technical Specification shall be read in conjunction with MRTS01 *Introduction to Technical Specifications*, MRTS50 *Specific Quality System Requirements*, and other Technical Specifications as appropriate.

This Technical Specification forms part of the Transport and Main Roads Specifications Manual.

Glass-fibre Reinforced Polymer (GFRP) reinforcement is covered by MRTS271 *Glass Fibre Reinforced Polymer (GFRP) Reinforcement*.

## 2 Definition of terms

This Technical Specification accepts with amendments Clause 2 *Definitions*, Item 2.1 of ATS 5310 *Supply and Placement of Steel for the Reinforcement of Concrete*.

### Addition

The terms used in this Technical Specification shall be as defined in Clause 2 of MRTS01 *Introduction to Technical Specifications*.

Additional terms used in this Technical Specification shall be as defined in Table 2.

**Table 2 – Definition of terms**

Term	Definition
Accepted	Where 'accepted' the provisions of the ATS are mandatory.
Cage	Two or more reinforcing bars joined together (welded or tied).
Pre-fabricated cage	Reinforcing cage fabricated off-site at a separate location to the construction site for on-site works, or at a location separate to the precast yard for precast works. Includes cages for piles to MRTS63 <i>Cast-In-Place-Piles</i> , MRTS63A <i>Piles for Ancillary Structures</i> , or MRTS64 <i>Driven Tubular Steel Piles (with reinforced concrete pile shaft)</i> .

Term	Definition
Processing	Any process which significantly changes the shape and properties of the reinforcing steel. Processing includes cold-rolling, cold-drawing, de-coiling and straightening (including manufacture of circular cages (including pile cages), and automatic electric-resistance welding (adapted from AS/NZS 4671:2019 <i>Steel for the reinforcement of concrete</i> Clause 3.19). The cutting and bending of reinforcing bars, and the production of steel reinforced concrete pipe cages to MRTS25 <i>Steel Reinforced Precast Concrete Pipes</i> where the pipe is subsequently load tested, is not considered to be processing.
Registered	Pre-qualified product or supplier in accordance with departmental registration schemes: <ul style="list-style-type: none"> <li>• <i>Registration Scheme: Suppliers and Products for Bridges and Other Structures</i></li> <li>• <i>Product Index for Bridges and Other Structures</i>, and</li> <li>• <i>Construction Materials Testing (CMT) Supplier Registration Scheme</i>.</li> </ul> Registration for certain products and suppliers is a pre-requisite for Administrator approval, not a substitute.

### 3 Referenced documents

This Technical Specification accepts with amendments Clause 3 *Referenced Documents*, Item 3.1 of ATS 5310 *Supply and Placement of Steel for the Reinforcement of Concrete*.

#### Addition

Table 3 lists documents referenced in this Technical Specification.

**Table 3 – Referenced documents**

Reference	Title
AS/NZS 1554.3	<i>Structural steel welding, Part 3: Welding of reinforcing steel</i>
AS/NZS 4671	<i>Steel for the reinforcement of concrete</i>
ATS 5310	<i>Supply and Placement of Steel for the Reinforcement of Concrete</i> , Austroads
ISO 15620	<i>Welding – Friction welding of metallic materials</i>
MRTS01	<i>Introduction to Technical Specifications</i>
MRTS25	<i>Steel Reinforced Precast Concrete Pipes</i>
MRTS50	<i>Specific Quality System Requirements</i>
MRTS63	<i>Cast-In-Place-Piles</i>
MRTS63A	<i>Piles for Ancillary Structures</i>
MRTS64	<i>Driven Tubular Steel Piles (with reinforced concrete pile shaft)</i>
MRTS271	<i>Glass Fibre Reinforced Polymer (GFRP) Reinforcement</i>
MRTS278	<i>Supply of Structural Fasteners</i>
PIBOS	<i>Product Index for Bridges and Other Structures</i>
SCM-P-015	<i>Registration Scheme: Suppliers and Products for Bridges and Other Structures</i>
SD1043	<i>Reinforcing Steel – Standard Bar Shapes, Typical Details and Notes</i>

Reference	Title
SD1044	<i>Reinforcing Steel – Lap Lengths</i>
SD1404	<i>Traffic Signals – Mast Arm Anchor Cage Fabrication Details</i>
-	<i>Construction Materials Testing (CMT) Supplier Registration Scheme</i>

#### 4 Quality system requirements

This Technical Specification accepts Clause 4, Item 4.1 of ATS 5310 *Supply and Placement of Steel for the Reinforcement of Concrete*.

This Technical Specification accepts with amendments Items 4.2 and 4.3.

This Technical Specification does not accept Items 4.4 and 4.5. These items do not apply in Queensland.

##### Addition

Add the following to Item 4.2:

The Submission Details for Hold Point 1 shall also include the Transport and Main Roads Registration Certificate of the reinforcing steel supplier, and of the pre-fabricated cage manufacturer if applicable.

Registration of reinforcing steel suppliers and fabricators is governed by the *Registration Scheme: Suppliers and Products for Bridges and Other Structures*. In addition to the requirement of ATS 5310 *Supply and Placement of Steel for the Reinforcement of Concrete* that producers and processors be third-party certified for their respective activities, all other suppliers shall be third-party product certified for traceability. Registration of bar chairs and mechanical reinforcing bar splices is governed by the *Product Index for Bridges and Other Structures*.

Registered suppliers of precast concrete may have processing of reinforcement included in their scope of registration, under the limitations listed in the Registration Scheme, in lieu of third-party certification. Third-party certification is required for processing not covered by the exemptions in the Registration Scheme.

All third-party product certification schemes for steel reinforcement production and processing must have both scheme and conformity assessment body accreditation by JAS-ANZ and be accepted by the Director (Structures Construction Materials).

Where the reinforcing steel processor has third-party certification, the steel producer certificate is not required to be submitted.

Third-party product certification is not mandatory for the supply or processing of stainless steel reinforcement. Where third-party certification is not held, test reports shall be made available on request.

Third-party certification for stainless steel is encouraged.

Note: The 'Supplier' may fall into different registration sub-categories depending on the supply and processing chain used.

Add the following to Item 4.3:

The requirements for the supply and fabrication of reinforcing elements include the use of registered products and suppliers. For all enquiries email Structures Construction Materials [TMRStructuralMaterials@tmr.qld.gov.au](mailto:TMRStructuralMaterials@tmr.qld.gov.au).

## 5 Materials

This Technical Specification accepts Clause 5, Items 5.1 to 5.6 and Items 5.20 and 5.21 of *ATS 5310 Supply and Placement of Steel for the Reinforcement of Concrete*.

This Technical Specification accepts with amendments Items 5.7 to 5.18 and 5.19.

### Difference

This Technical Specification replaces Items 5.7 to 5.16 with the relevant clauses of *MRTS70 Concrete* which governs bar chairs and spacers in Queensland.

### Difference

The Hold Point in Item 5.17 becomes Hold Point 3.

### Addition

Add the following to Item 5.18:

When tested, the spliced connection shall possess an ultimate tensile strength exceeding 1.25 times the characteristic yield strength of the reinforcing bar.

Couplers shall be re-tested for conformance to this specification every three years.

For registration, couplers are assessed assuming a 500 MPa bar.

Add the following to Item 5.19:

- c) friction-welded to a steel reinforcing bar in accordance with ISO 15620, in a controlled factory environment.

Friction-welded couplers will only be registered as a product when there is a corresponding registered supplier to weld them to a steel reinforcing bar (see Clause 9.11).

### 5.22 Substitutions

#### New

Substitution of different sizes, grades or ductility class of steel reinforcement to that shown on the drawings shall not be made unless approved in writing by the Designer and the Administrator. The application shall be forwarded at least three weeks prior to the date on which the steel reinforcement is required to be placed **Milestone**

Substitution shall be permitted only if the structure is not adversely affected by the change.

Substitution shall not proceed until the Administrator has approved the change. **Hold Point 2** No additional payment shall be made on account of any approved substitution.

## 6 Handling, storage and surface condition

This Technical Specification accepts Clause 6, Items 6.2 to 6.4 and Items 6.6 to 6.7 of *ATS 5310 Supply and Placement of Steel for the Reinforcement of Concrete*.

This Technical Specification accepts with amendments Items 6.1 and 6.5 of *ATS 5310 Supply and Placement of Steel for the Reinforcement of Concrete*.

### Addition

Add the following to Item 6.1:

Traceability shall include records of the steel producer's or steel processor's (as applicable) batch or bundle numbers. Where steel is supplied by a steel processor, the steel processor is responsible for maintaining traceability to the steel producer's records.

### Addition

Add the following to Item 6.5:

Spray paint marking of cages for lifting points and cage identification for traceability is accepted subject to the following requirements:

- a) The length of the paint mark on the bar is no more than 100 mm.
- b) The paint markings are kept to a minimum to mark lifting points and for cage identification or traceability.
- c) The paint mark is located no closer than 200 mm from the end of any bar.
- d) The paint thickness is as thin as practical and does not alter the effective rib height on a deformed or ribbed bar.
- e) Paint markings are only applied to deformed or ribbed bar, and not round bar.
- f) Any paint marking of prestressing strands on the section of strand located within the concrete element is not accepted.

## 7 Placing and fixing

This Technical Specification accepts Clause 7, Items 7.1 to 7.8 and Item 7.10 of *ATS 5310 Supply and Placement of Steel for the Reinforcement of Concrete*.

This Technical Specification accepts with amendments Items 7.9 and 7.11.

### Addition

Add the following to Item 7.9:

Suppliers of pre-fabricated reinforcing cages (fabricated either within or outside of Australia) shall be registered suppliers, in accordance with the *Registration Scheme: Suppliers and Products for Bridges and Other Structures*.

Pre-fabricated reinforcing cages shall comply with all other requirements of this Technical Specification.

Reinforcing bar threaded for installation of nuts (e.g. SD1404) shall be tested as a bolt assembly in accordance with *MRTS278 Supply of Structural Fasteners*.

### Difference

The Hold Point 3 in Item 7.9 of ATS 5310 does not apply to cages manufactured and placed in precast yards.

The Hold Point of Item 7.9 becomes Hold Point 4.

The Hold Point of Item 7.11 becomes Hold Point 5.

### **7.12 Adjustments to placement**

#### New

Reinforcing bars may be adjusted laterally by a maximum of 50 mm to avoid conflict with cast-in items or voids, unless noted otherwise on the Drawings. Cover to reinforcement shall not be lessened by this adjustment. The clear distance between parallel bars, other than bars lapped together shall not be less than 40 mm.

Cover to voids that will subsequently be filled with grout (e.g. transverse stressing bar ducts) shall be no less than the specified cover minus 10 mm.

This reduced cover to grouted void allowance is equivalent to increasing the tolerance on cover from -5 to -10 mm.

### **7.13 Fixing of reinforcement (pile cages)**

#### New

Lengths of reinforcing cage for piles may be secured together with clamps for the purpose of lifting and installation of the cage only, with bar lap lengths for structural continuity to remain as per the Drawings. The number, placement and detail of these clamps shall be included in the lifting design certification of the cage. Clamps shall not intrude into the concrete cover zone.

## **8 Bending**

This Technical Specification accepts Clause 8, Items 8.1 to 8.7 and 8.9 to 8.11 of ATS 5310 *Supply and Placement of Steel for the Reinforcement of Concrete*.

This Technical Specification accepts with amendments Item 8.8.

This Technical Specification does not accept Item 8.12. This item does not apply in Queensland.

### Difference

The Hold Point of Item 8.8 become Hold Point 6.

### **8.13 Bending details**

#### New

If bending details are not shown on the drawings, bends shall be made in accordance with Standard Drawings 1043 and 1044.

## 9 Splicing of reinforcement

This Technical Specification accepts Clause 9, Items 9.1 to 9.4 and Items 9.7 to 9.10 of *ATS 5310 Supply and Placement of Steel for the Reinforcement of Concrete*.

This Technical Specification accepts with amendments Items 9.5 and 9.6.

### Addition

Add the following to Item 9.5:

For unscheduled laps, or where the lap length is not shown on the drawing, laps lengths shall be as per SD 1044.

Add the following to Item 9.6:

Mechanical bar splices shall be as detailed on the Drawings. The Contractor may propose an alternative registered bar splice for approval by the Administrator.

### **9.11 Friction-welded couplers**

#### New

Friction-welded couplers shall only be fitted to steel reinforcing bar by a Transport and Main Roads registered supplier.

For the purposes of the *Supplier Registration Scheme: Bridges and Other Structures*, this process falls under 'fabrication of reinforcing cages', until specified otherwise in that document.

## 10 Welding of carbon steel reinforcement

This Technical Specification does not accept Clause 10, Item 10.1 of *ATS 5310 Supply and Placement of Steel for the Reinforcement of Concrete*. This item does not apply in Queensland.

This Technical Specification accepts Clause 10, Items 10.2 to 10.6, Items 10.9 to 10.11 and Items 10.13 to 10.16.

This Technical Specification accepts with amendments Items 10.7 to 10.8, and Item 10.12.

This Technical Specification does not accept Item 10.17

### Addition

Add the following to Item 10.7:

For pre-fabricated cages and reinforcement welded in precast yards, the submission for Hold Point 6 shall be replaced by submission of an applicable Transport and Main Roads Registration Certificate covering these Works. Precast concrete and pre-fabricated cage suppliers shall have welding of reinforcement included in their supplementary scope of registration. Such registered suppliers are not required to requalify their welders every 12 months, but shall comply with AS 1554.3 in this regard, keeping adequate training and supervision records.

Sub-items (a) to (e) will be assessed as part of supplier registration.

The Hold Point of Item 10.7 becomes Hold Point 7.

Add the following to Item 10.8:

For locational tack welding only, the welding supervisor is not required to be on Site during all welding operations. The welding supervisor shall assess all welders for competence with adequate records kept; qualification to AS 1554.3 Clauses 4.12.2.2 or 4.12.2.3 is not required. A suitably qualified supervisor's delegate as per AS 1554.3 is to be on Site to monitor welding.

Add the following to Item 10.12:

Splice welds may also be single-lap splice welds (joint types L-d, L-e, L-f to AS 1554.3), noting the additional length required.

Add the following to Item 10.17:

Tensile testing of splices is only required when specified by AS 1554.3, with acceptance criteria as per that Standard

## 11 Welding stainless steel reinforcement

This Technical Specification accepts Clause 11, Items 11.1, 11.2, 11.4, 11.6 to 11.10 of *ATS 5310 Supply and Placement of Steel for the Reinforcement of Concrete*.

This Technical Specification accepts with amendments Items 11.3 and 11.5.

### Addition

Add the following to Items 11.3 and 11.5:

The submissions for Hold Point 8 and Hold Point 9 shall include an applicable Transport and Main Roads Registration Certificate covering these Works.

The Hold Point of Item 11.3 becomes Hold Point 8.

The Hold Point of Item 11.5 becomes Hold Point 9

## 12 Tolerances

This Technical Specification accepts with amendments Clause 12, Item 12.1 of *ATS 5310 Supply and Placement of Steel for the Reinforcement of Concrete*.

This Technical Specification accepts Item 12.2.

### Difference

Replace the last row of Table 12.1 with the following:

Bar or mesh	Tolerance
For precast concrete	+ 0, -10 mm
For prestressed concrete (deck units, winged planks, girders, piles) manufactured to MRTS73	+ 0, -5 mm

Note: For the purposes of Table 12.2, precast elements such as panels and culverts are considered walls/slabs for determining the tolerance for bar spacings.

### **13 Standard test methods**

#### New

Test methods specified in the reference standards shall be used.

All testing for conformance required by this Technical Specification and ATS 5310 *Supply and Placement of Steel for the Reinforcement of Concrete*, shall be conducted in a laboratory holding National Association of Testing Authorities (NATA) accreditation, or equivalent mutual accreditation recognised by International Laboratory Accreditation Cooperation (ILAC) for that test. Test reports shall be in English.

## Annexure A: Summary of Hold Points, Witness Points and Records

This Technical Specification accepts with amendments Annexure A of ATS 5310 *Supply and Placement of Steel for the Reinforcement of Concrete*.

### Difference

Replace the table of hold points with:

Clause	Hold Point	Witness Point	Record
4.2	1. Delivery of reinforcing steel to the Site (14 days)		Quality Plan, including details of approvals, certification and/or test results and Transport and Main Roads registration certificate(s)
5.17	2. Installation of a mechanical reinforcing bar splice (14 days)		Registration/certification/approval or test results demonstrating compliance with this Specification
5.21	3. Substitution of reinforcing steel		Proposal for substitution
7.9	4. Placement of large reinforcing cage (24 h)		Certification of lifting design/drawing
7.10		1. Inspection of imported cages (7 days)	
7.11	5. Concrete placement where electrical conductivity is specified (24 h)		Evidence of electrical conductivity
8.8	6. Hot bending of bars (24 h)		Proposal for hot bending of bars
9.7		2. Installation of mechanical reinforcing bar splices (24 h)	
10.7	7. Welding of reinforcing steel (7 days)		Welding details and procedures or Transport and Main Roads registration certificate
10.15		3. Inspection of splice welds (24 h)	
11.3	8. Welding of stainless reinforcing steel (14 days)		Independent assessment of the specific welding shop or Transport and Main Roads registration certificate
11.5	9. Welding of stainless reinforcing steel (14 days)		Evidence of qualification of welding procedure or Transport and Main Roads registration certificate

